

# THE ARCHITECTURAL DRAWING A METHOD OF BUILDING ANALYSIS, A STUDY OF UNIQUE BUILDINGS

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## **Abstract**

The aim of this educational innovation project is the study of the interesting building. In this case the exercises are focused in those similar tasks being currently performed by professionals.

The detailed study of a building makes easier the understanding of it, as well as to analyze the building in all its dimensions.

First of all, an initial assessment about knowledge and skills of the new students will be performed for the purpose of achieving an optimal adaptation.

### **1.-The Goals are:**

- Study and analysis of interesting buildings
- Building as a study element for the future professionals in Building.
- Analysis of the building elements like educational models, and documentation to be issued for educational purposes.

### **2. Description of the project and outcome phases Actions:**

- An architectural survey (elevations and sections) of the Unique buildings will be produced.
- The selected buildings will be analyzed by producing the plans.

Our plan is to use these types of activities to make the students perform similar works to those performed by professionals.

In order to encourage the students to participate in the educational process the following activities are proposed:

- a) With the aim students can get a better understanding on their achievements we address:
  - To do a self assessment
  - To evaluate the exercises of other mates
  - To comment corrections in public presentations
- b) To motivate students for documenting the different topics of the subject program
- c) To identify practical exercises
- d) To produce practical exercises
- e) To increase the awareness of the students at the required exigency level as well as to be aware of their own failures
- f) To gain a clear view of the objectives
- g) To get a higher level of involvement and participation by the students
- h) To acquire skills on finding and selecting, with valuable criteria the useful sources of information
- i) To propose the elaboration of a monographic work to be realized in a team of students
- j) To computerize the studied models for their publication in the existing educational platforms for the students. A subsequent application of them in the learning program of the Architectural Drawing I and II subjects.
- k) To produce open information repositories to be available in the educational platforms.

### **3. Expected results:**

To improve and promote the team work in order to increase the exchange of knowledge's and promote the integration of students in their future professional life.

Incorporation of new technologies in the learning by:

- Applying new educational and assessment methodologies to be applied to the students and their

works. We intend to continue progressing towards the convergence to the European Space of Higher Education.

- The study of singular buildings and their realization on technical drawings by using learning systems with progressive difficulty level.

This will allow extending the exercises in the program subject in the area of technical drawing systems and plans survey.

This will help the student to know his city and is excellent way of helping us to bring students closer to the professional work, and thus making easier access to a job. What it is the fundamental objective of the university studies.

Keywords: the architectural drawing method of analysis building, study of singular buildings

## **1 INTRODUCTION**

The aim of this paper is to provide an overview of the performed works by the PIE-DIBARQ group in the UPM's Educational Innovation in the courses to be given in 2012-13, 2013-14 and 2014-15. In addition it illustrates the efforts undertaken in applying an ad-hoc methodology well adapted to meet the new requirements of the European Convergence of higher education systems by means of publishing them through publications, participation in congresses, conferences, and various virtual platforms with free or restricted access.

The Educational Innovation project given by the Polytechnic University of Madrid aims to study the unique buildings. As a professional the student must be able to draw existing buildings with a view to renovate them.

During this project practical exercises will be carried out as a similar work to the type that would normally be performed by professionals. The building survey will help to understand, analyze, and study it in all its dimensions.

For this purpose, an initial assessment on knowledge and skills will be performed with the aim of getting a better adaptation of the new students.

## **2 OBJECTIVES**

The objectives will be:

- Study and analysis of unique buildings.
- The building construction as an element of study for future building professionals
- Analysis of teacher practices
- Documentation production related to teaching

### **2.1 Project aims**

- Study and analysis of unique buildings.
- The building construction as an element of study for future building professionals
- Computerization of the studied models to be published in the existing teaching platforms for their dissemination to the students.
- Application of such models to the learning of ARCHITECTURAL DRAWING I and ARCHITECTURAL DRAWING II subjects.
- Set up of open data repositories of each subject to be addressed from the virtual platforms.
- A plans surveying of unique building will be performed.
- The buildings will be analyzed by drawing all the plans necessary for their complete definition.
- The digital models will be produced and configured to be issued in the virtual platforms.

This kind of works helps students to the activities being done by building and construction professionals.

We intend to adapt the PIE-DIBARQ-2014-15 to the general objectives of the U.P.M and the E.T.S.E.M. (ESCUELA TÉCNICA SUPERIOR DE EDIFICACIÓN).

### 3 EXPOSITION

In graphic designing and defining of a building use must be made of appropriate graphic representation systems to each purpose. The plans and/or horizontal sections are the definition and construction diagrams of the building, this permits them to determine their function, arrangement of components, evaluate their size, etc., providing a understandable view of a building. But it is a limited information about its architectonic character which must be complemented with the vertical sections giving a clear idea about the existing floors, the heights of a building, the roof shapes, and the floor heights regarding the outside floor surface, and finally with the elevations of the building as a whole. All of it has become the pictorial representation of the building.

The study about shapes and proportions of models has been developed by using the adequate exercises, as well as their volumes decomposition allowing a greater learning on spatial visualization and better knowledge of the various graphic representations.

#### 3.1 Achieved actions

The process was carried out through different increasing levels of difficulty being applied in the teaching of 'Graphic Expression in the ARCHITECTURAL DRAWING I and II' subjects in the EUATM.

With this aim the study of various building models have been raised, either already performed or in progress, with a design of the team who are authors of this paper. They are provided to the student in A3 format, with enough data to find out the requested solutions. They are related with the graphic data interpretation, which at the same time allows performing a continuous follow up the outcomes provided in the student works.

An adequate 3D design of the model and its representation in 2D by using a CAD program is the key starting point to progress in an innovative way by requesting valid solutions in the proposed exercises, for instance to obtain the horizontal sections of an object giving as input data the model with elevations and vertical sections instead of the more usual input data as elevations and horizontal sections.

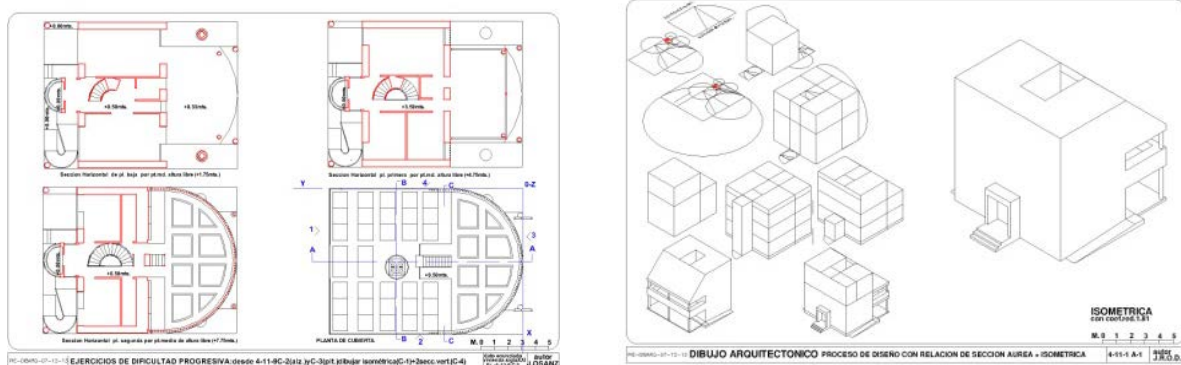


Fig. 1: Exercises published in Moodle Platform of the UPM Universidad Politécnica de Madrid

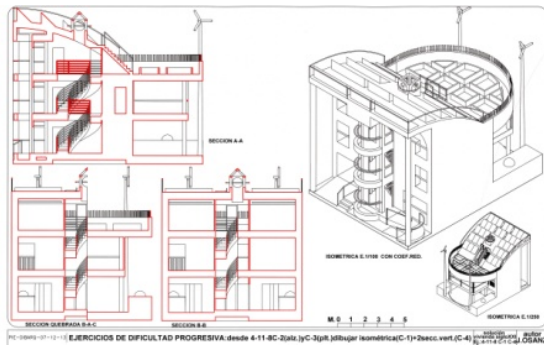


Fig. 1: Some Building exercise

Fig. 2: Detail of Moocs in the Open Course Ware (OCW)

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All of it focuses on improving and promote the team work and make easier the knowledge exchange and the student integration process in the professional jobs.

Another aim is the introduction of new information technologies to teaching by means of:

- Usage of the web classroom to get full data about general information including indicators, exercises, theoretical issues.
- Creation and updates of theoretical and practical issues.
- Exchanging and finding information via Internet.
- Study of the possible applications of the various CAD programs to the architectonic drawing.
- More flexibility in the learning time by adapting it to personal needs.
- Motivate students using attractive tools and their knowledge of new technologies.
- Setting of a mechanism to evaluate and provide indicators for the various

It is intended to continue progressing towards the European Convergence of higher education systems applying new teaching methodologies as well as evaluation techniques of the student works in completing courses, and including skills on team works, public presentations, etc.

The study of unique buildings and their graphical representation using systems with different increasing levels of difficulty will allow extending the class exercises relative to representation systems and plans surveying. Not only the exercises of the studied buildings are being realized in 2D and 3D but also physical mock ups.

All the exercises are been published in Moodle Platform of the Universidad Politécnica de Madrid, and the students of ARCHITECTURAL DRAWING I and II' subjects in the EUATM, can used them. We also have published them as a Moocs in the Open Course Ware (OCW) and everyone can used them.

We can see in these figures some examples of our work.

Exercises published in Moodle Platform of the UPM Universidad Politécnica de Madrid, A study of an archaic house and a study of a Roman house.

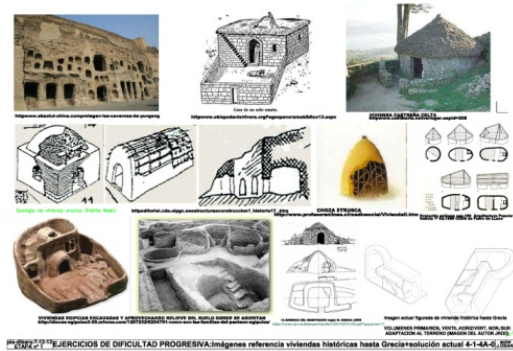


Fig. 1: A study of an archaic house

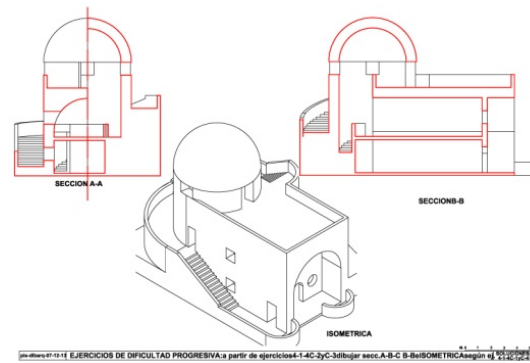


Fig. 2: Detail of an archaic House

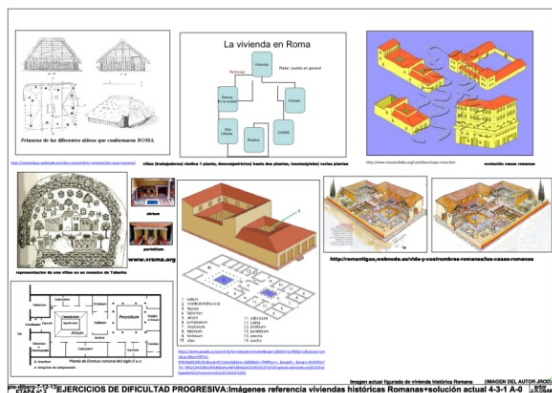


Fig. 1: A study of a Roman house

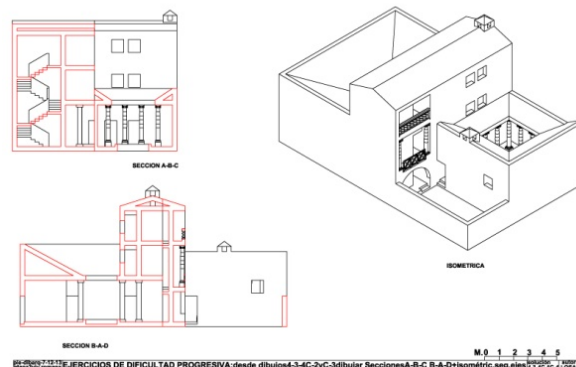


Fig. 2: Detail of a Roman House

All the goals have been development, and some more activities has been done such as making with a 3D printer called MARKETBOT REPLICATOR TM 2 DESKTOP 3D PRINTER

We can see some examples in these figures

Exercises published in Moodle Platform of the UPM Universidad Politécnica de Madrid, A study of a XXI century house high difficulty in 2D and in MOP UP

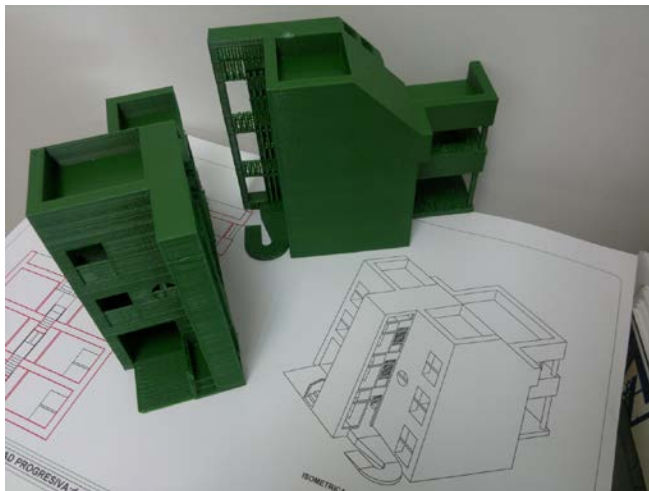


Fig. 1: A study of a XXI century house high difficulty

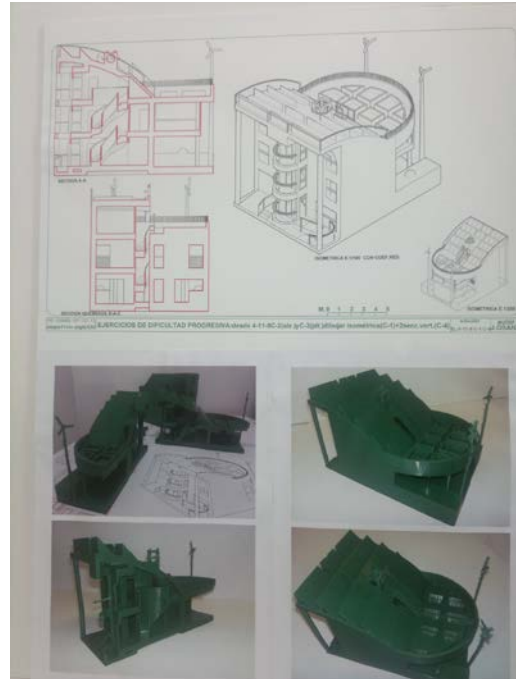


Fig. 2: A study of a XXI century house low difficulty

## 4 CONCLUSION

This paper is the result of the works that have been performed by the PIE-DIBARQ group in the UPM's Educational Innovation in the courses to be given in 2012-13- 2013-14. and 2014-15. In addition illustrate the efforts undertaken in applying an ad-hoc methodology well adapted to meet the new requirements of the European Convergence of higher education systems by means of publishing them through publications, participation in congresses, conferences, and various virtual platforms with free or restricted access.

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A paper was presented in the APEGA congress with the title: "La vivienda unifamiliar a través de su representación grafica". Some of the models performed in EDIGRAFICA by students were also presented being awarded with the first prize of the competition.

This will help the student to know his city and is excellent way of helping us to bring students closer to the professional work, and thus making easier access to a job. What it is the fundamental objective of the university studies.

The educational innovation project that is presented is the study of the singular buildings. As professional the student at the time it when he exercises his profession will have to be capable of drawing existing buildings for its later rehabilitation. There were realized exercises similar to the type of work that a professional would realize. The study of a building will help to deal, to analyze, to study the building in all his dimensions. For it there will be realized an initial evaluation of knowledge and skills to obtain a better adjustment of the new pupils.

The aims will be Study and Analysis of singular buildings. The Analysis of the elements of building, like educational models and creates a documentation that helps as a support to the teaching.

Actions there will be realized a raising plane of the singular buildings. The buildings were analyzed realizing the planes necessary for his total definition. With this type of works it is tried to bring over to the pupils to the type of work that it will realize when he is a professional. There will be stimulated the participation of the pupils in the formative process realizing the following activities:

A.- For the best comprehension by the pupils, of the valuation of their work it will be promoted: -

Auto evaluation. -

Evaluation of exercises for other companions. -

Public Corrections.

B. – Promote the work of documentation on different topics of the program of the subject.

C. - Offer of practical exercises for the pupils.

D. - Creation of exercises in order that the pupil has elements of self-help in his learning:

E. - Major raising awareness of the pupils so much of the level of exigency of the subject as of his own failures and this way to avoid the failure

F. - clear Vision of the aims that try to be obtained.

G. - Major implication and participation of the pupils in the learning process.

H. - To be able to find and to select the really useful sources of information.

I - Accomplishment of work in group for the pupils: offer of accomplishment of a monographic work

J. - Computerization of the studied models, for his publication in the Educational existing Platforms, and his diffusion obtains to the pupils Telematic route. Application of the above mentioned models to the education of the disciplines of Architectural Drawing I and Architectural Drawing II

K. - Creation of repositories of the subject in opened to publish them in the corresponding platforms.

#### Awaited Results:

This work will help our students improving and promoting the teamwork. It will help them in the exchange of knowledge and the facility of integration in the professional life, as well as, with the incorporation of the new technologies in their formation.

This experience is an excellent way of helping us to bring students closer to the professional work, and thus making easier access to a job. What it is the fundamental objective of the university studies.

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